

**AMENDMENTS TO THE CLAIMS**

**This listing of claims supersedes all prior versions and listings of claims in this application:**

**LISTING OF CLAIMS:**

1. *(Currently Amended)* A heterojunction field effect type semiconductor device, comprising:

- a GaAs substrate;
- a channel layer formed over said GaAs substrate;
- a first semiconductor layer including no aluminum formed over said channel layer;
- a cap layer of a first conductivity type formed on said first semiconductor layer, said cap layer creating a first recess on said first semiconductor layer;
- first and second ohmic electrodes formed on said cap layer;
- a second semiconductor layer of a second conductivity type formed on said first semiconductor layer within said first recess, said second semiconductor layer being isolated from said cap layer;
- a gate electrode formed on said second semiconductor layer; and
- a third semiconductor layer made of GaAs/AlGaAs interposed between said first semiconductor layer, wherein said third semiconductor layer comprises an GaAs layer formed on said AlGaAs layer, and said cap layer and having a second recess,

said second semiconductor layer passing through the second recess of said third semiconductor layer to reach said first semiconductor layer.

2. *(Original)* The heterojunction field effect type semiconductor device as set forth in claim 1, wherein said channel layer comprises an undoped InGaAs layer.

3. *(Original)* The heterojunction field effect type semiconductor device as set forth in claim 1, wherein said channel layer comprises a GaAs layer of said first conductivity type.

4. *(Original)* The heterojunction field effect type semiconductor device as set forth in claim 1, wherein said first semiconductor layer comprises an undoped GaAs layer.

5. *(Previously Presented)* The heterojunction field effect type semiconductor device as set forth in claim 1, wherein each of said cap layer comprises a GaAs layer.

6. *(Previously Presented)* The heterojunction field effect type semiconductor device as set forth in claim 1, further comprising a wide recess etching stopper layer of said first conductivity type beneath said cap layer.

7. *(Original)* The heterojunction field effect type semiconductor device as set forth in claim 6, wherein said wide recess etching stopper layer comprises an AlGaAs layer.

8. *(Original)* The heterojunction field effect type semiconductor device as set forth in claim 6, wherein said wide recess etching stopper layer comprises an InGaP layer.

9. *(Cancelled)*

10. *(Original)* The heterojunction field effect type semiconductor device as set forth in claim 1, wherein said second semiconductor layer comprises a GaAs layer.

11. *(Original)* The heterojunction field effect type semiconductor device as set forth in claim 1, wherein said second semiconductor layer comprises an AlGaAs layer.

12. *(Original)* The heterojunction field effect type semiconductor device as set forth in claim 1, wherein said second semiconductor layer comprises an InGaP layer.

13. *(Original)* The heterojunction field effect type semiconductor device as set forth in claim 1, wherein said cap layer comprises:

an  $\text{In}_x\text{Ga}_{1-x}\text{As}$  ( $0 \leq x < 0.5$ ) cap layer; and

an  $\text{In}_{0.5}\text{Ga}_{0.5}\text{As}$  cap layer formed on said  $\text{In}_x\text{Ga}_{1-x}\text{As}$  cap layer,  
said device further comprising an InGaP wide recess etching stopper layer of said first  
conductive type beneath said  $\text{In}_x\text{Ga}_{1-x}\text{As}$  cap layer.

14. *(Cancelled)*

15. *(Previously Presented)* The heterojunction field effect type semiconductor device as  
set forth in claim 1, wherein said third semiconductor layer has a thickness of more than 5nm.

16. *(Previously Presented)* The heterojunction field effect type semiconductor device as  
set forth in claim 1, wherein said third semiconductor layer comprises:

an undoped AlGaAs layer; and

an undoped GaAs layer formed on said undoped AlGaAs layer.

17. *(Original)* The heterojunction field effect type semiconductor device as set forth in  
claim 16, wherein said first semiconductor layer is of said first conductivity type.

18. *(Previously Presented)* The heterojunction field effect type semiconductor device as  
set forth in claim 1, wherein said third semiconductor layer comprises:

an AlGaAs layer of said first conductivity type; and

an undoped GaAs layer formed on said AlGaAs layer.

19. *(Withdrawn)* A method for manufacturing a heterojunction field effect type semiconductor device, comprising:

growing at least a channel layer, a first semiconductor layer including no aluminum, a wide recess etching stopper layer of a first conductivity type, and a cap layer of said first conductivity type over a GaAs substrate by a first epitaxial growth process;

selectively removing said cap layer by using said wide recess etching stopper layer as a stopper to create a first recess within said cap layer;

depositing an insulating layer on the entire surface after said first recess is created;

perforating said insulating layer to expose said first semiconductor layer;

growing a second semiconductor layer of a second conductivity type by a second epitaxial growth process, so that said second semiconductor layer is buried in said first recess and contacts said first semiconductor layer;

forming a gate electrode on said second semiconductor layer; and

forming ohmic electrodes on said cap layer.

20. *(Withdrawn)* The method as set forth in claim 19, wherein said channel layer comprises an undoped InGaAs layer.

21. *(Withdrawn)* The method as set forth in claim 19, wherein said channel layer comprises a GaAs layer of said first conductivity type.

22. *(Withdrawn)* The method as set forth in claim 19, wherein said first semiconductor layer comprises an undoped GaAs layer.

23. *(Withdrawn)* The method as set forth in claim 19, wherein said cap layer comprises a GaAs layer.

24. *(Withdrawn)* The method as set forth in claim 19, wherein said wide recess etching stopper layer comprises an AlGaAs layer.

25. *(Withdrawn)* The method as set forth in claim 19, wherein said wide recess etching stopper layer comprises an InGaP layer.

26. *(Withdrawn)* The method as set forth in claim 19, further comprising partly removing said wide recess etching stopper layer in self-alignment with said cap layer after said first recess is created.

27. *(Withdrawn)* The method as set forth in claim 19, wherein said second semiconductor layer comprises a GaAs layer.

28. *(Withdrawn)* The method as set forth in claim 19, wherein said second semiconductor layer comprises an AlGaAs layer.

29. *(Withdrawn)* The method as set forth in claim 19, wherein said second semiconductor layer comprises an InGaP layer.

30. *(Withdrawn)* The method as set forth in claim 19, wherein said cap layer comprises:  
an  $\text{In}_x\text{Ga}_{1-x}\text{As}$  ( $0 \leq x < 0.5$ ) cap layer; and  
an  $\text{In}_{0.5}\text{Ga}_{0.5}\text{As}$  cap layer formed on said  $\text{In}_x\text{Ga}_{1-x}\text{As}$  cap layer,  
said device further comprising an InGaP wide recess etching stopper layer of said first conductive type beneath said  $\text{In}_x\text{Ga}_{1-x}\text{As}$  cap layer.

31. *(Withdrawn)* The method as set forth in claim 19, further comprising growing a third semiconductor layer interposed between said first semiconductor layer and said cap layer by said first epitaxial growth,

said insulating layer perforating comprising perforating said third semiconductor layer to create a second recess,

said second semiconductor layer passing through the second recess of said third semiconductor layer to reach said first semiconductor layer.

32. *(Withdrawn)* The method as set forth in claim 31, wherein said third semiconductor layer has a thickness of more than 5nm.

33. *(Withdrawn)* The method as set forth in claim 31, wherein said third semiconductor layer comprises:

an undoped AlGaAs layer; and

an undoped GaAs layer formed on said undoped AlGaAs layer.

34. *(Withdrawn)* The method as set forth in claim 33, wherein said first semiconductor layer is of said first conductivity type.

35. *(Withdrawn)* The method as set forth in claim 31, wherein said third semiconductor layer comprises:

an AlGaAs layer of said first conductivity type; and

an undoped GaAs layer formed on said undoped AlGaAs layer.